



The Impacts of Polluted Stormwater and Ordinance Provisions That Can Minimize Those Impacts

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Office of The Commissioner**

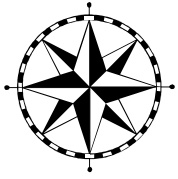
MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

Protecting Maine's Air, Land and Water



An aerial photograph of a suburban neighborhood. In the foreground, a road with a circular driveway leads to a row of houses. A large, green, rectangular field, possibly a sports field or a large lawn, dominates the middle ground. In the background, more houses and trees are visible. The text "When it rains, pollution happens" is overlaid on the image.

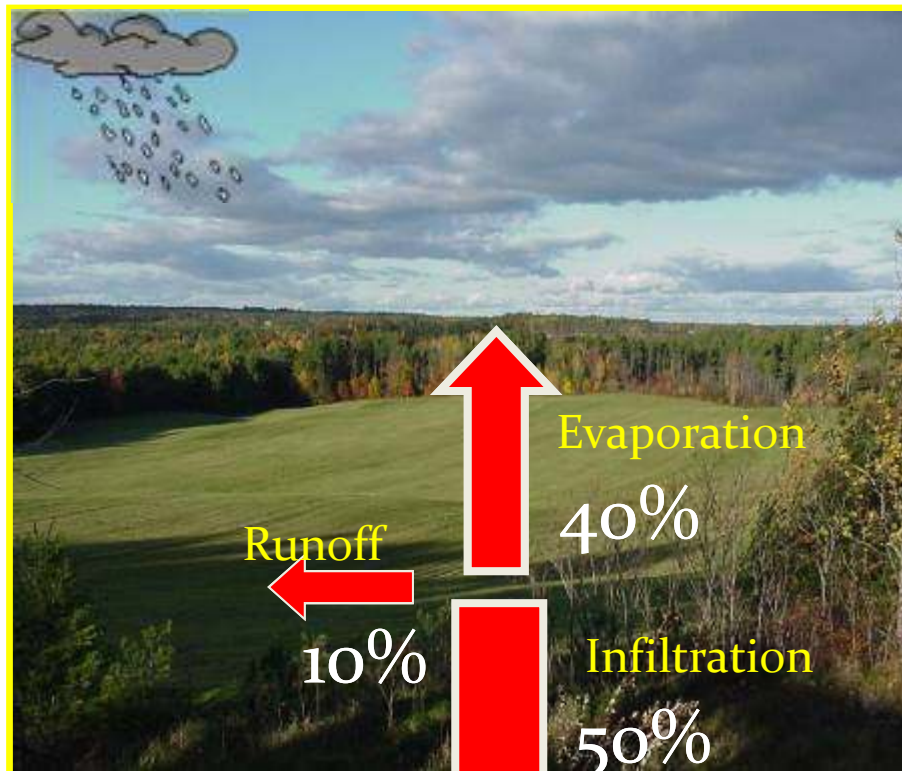
When it rains, pollution happens



Maine 's Water Budget Impacts From Development

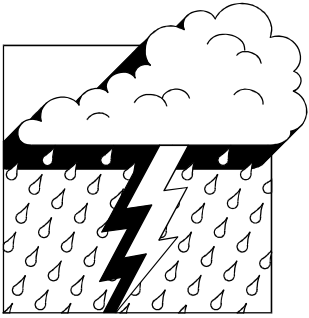
Natural Cover

75-100% Impervious Surface



Traditional Development Pushes rain off the site

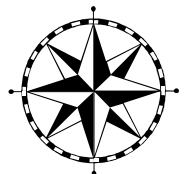




Development Impacts on Water Quality



Increased quantity
Decreased quality



Development Impacts on Water Quality



Increased quantity



CSOs

Decreased ground water levels



Erosion



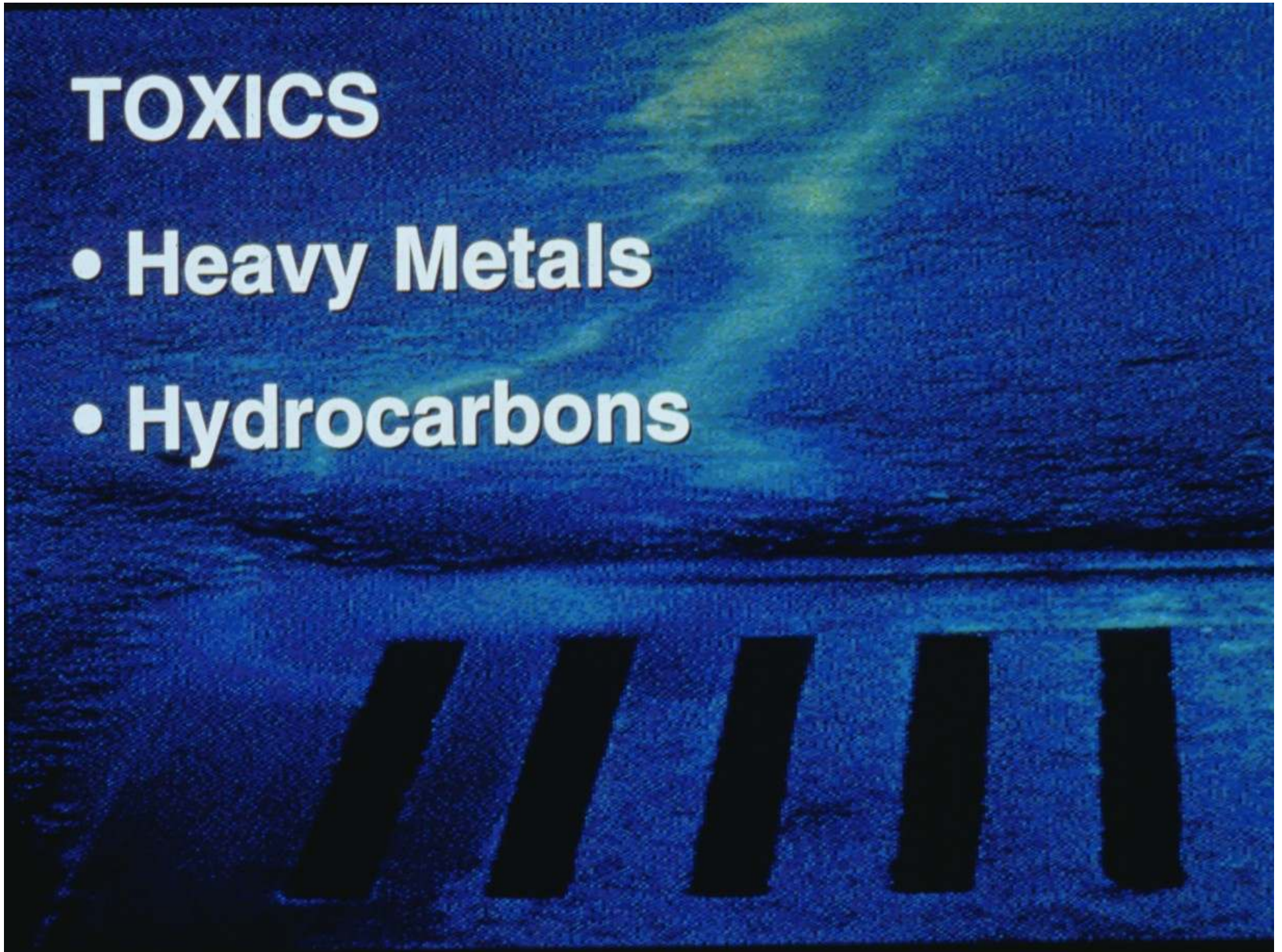
Flooding

IC and Stream Habitat



TOXICS

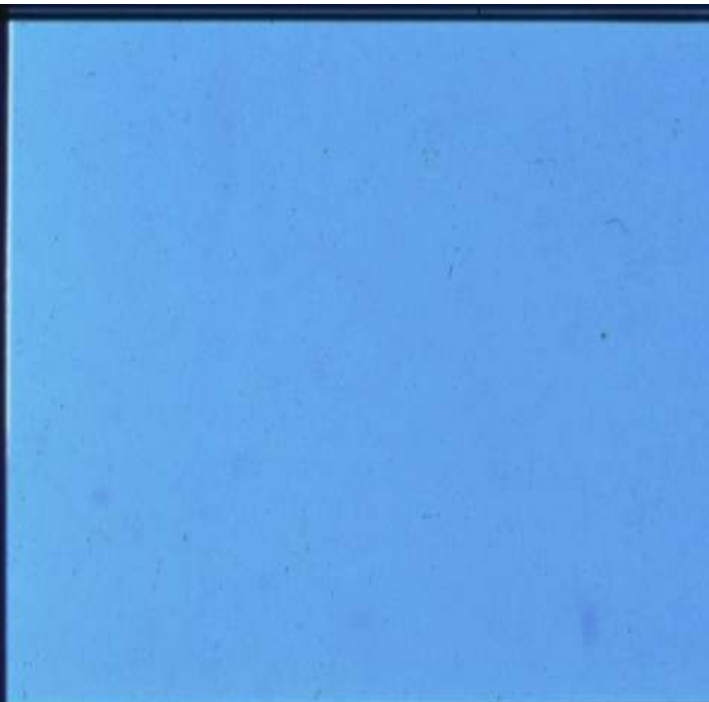
- Heavy Metals
- Hydrocarbons





SEDIMENTATION OF STREAM BED

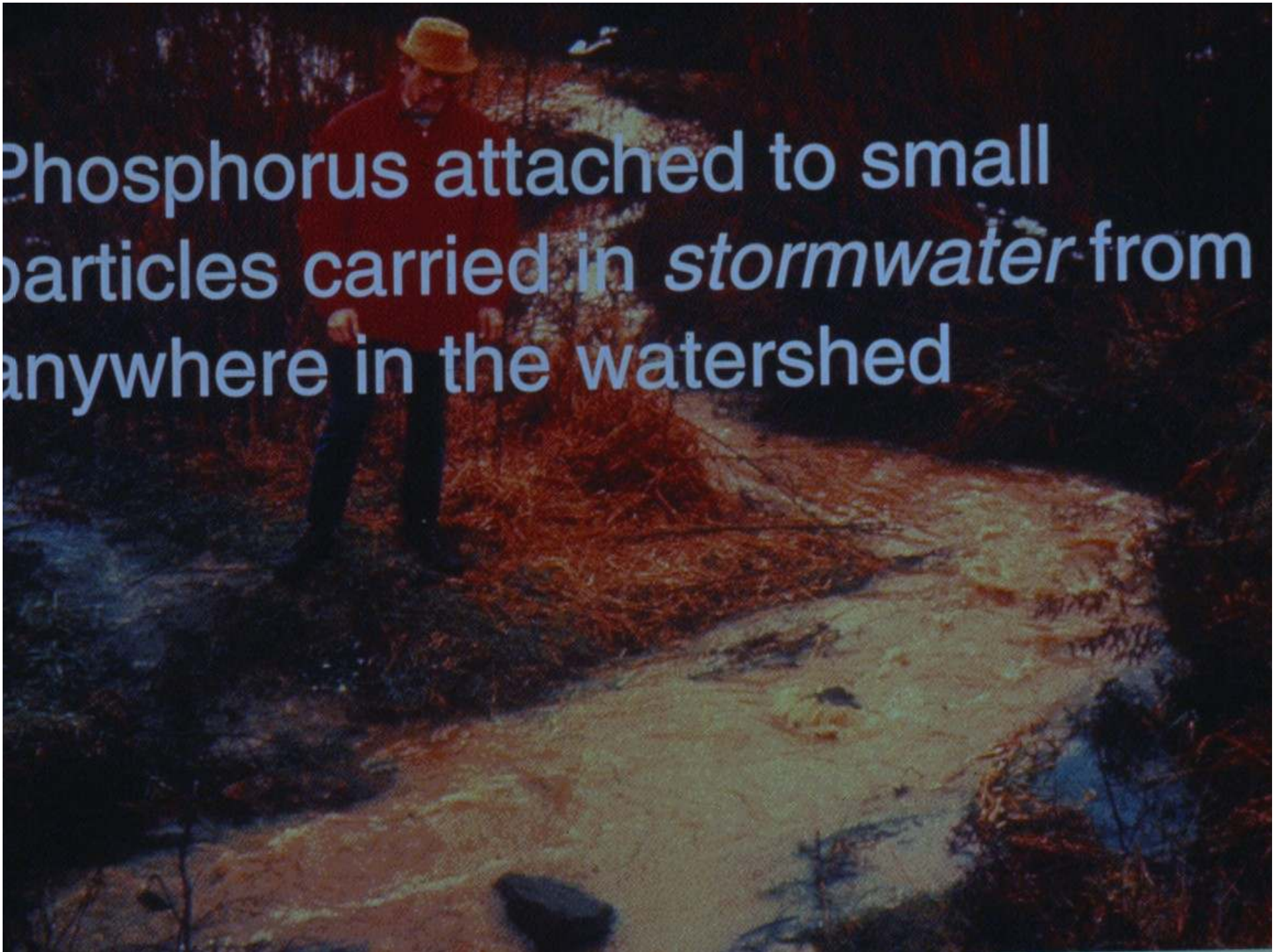




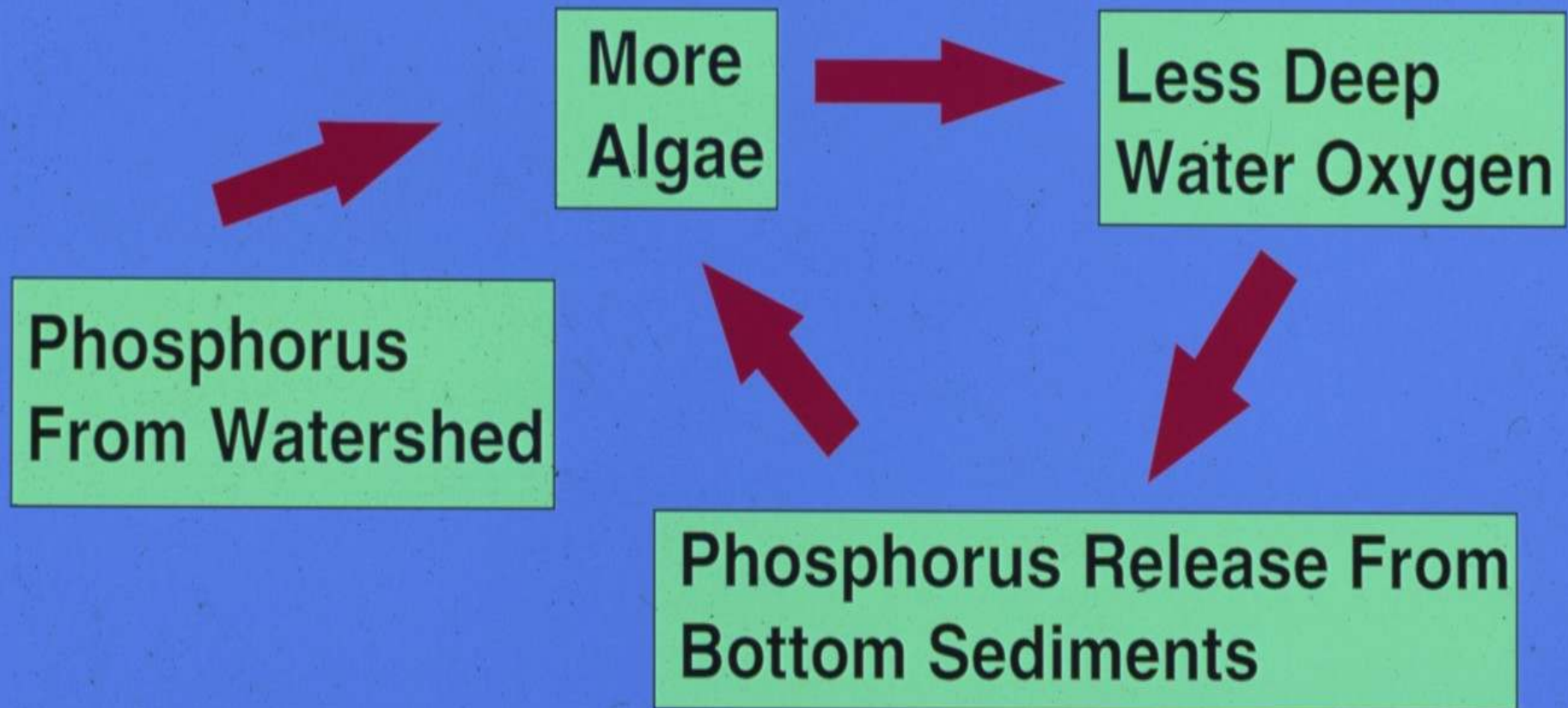
Nutrients

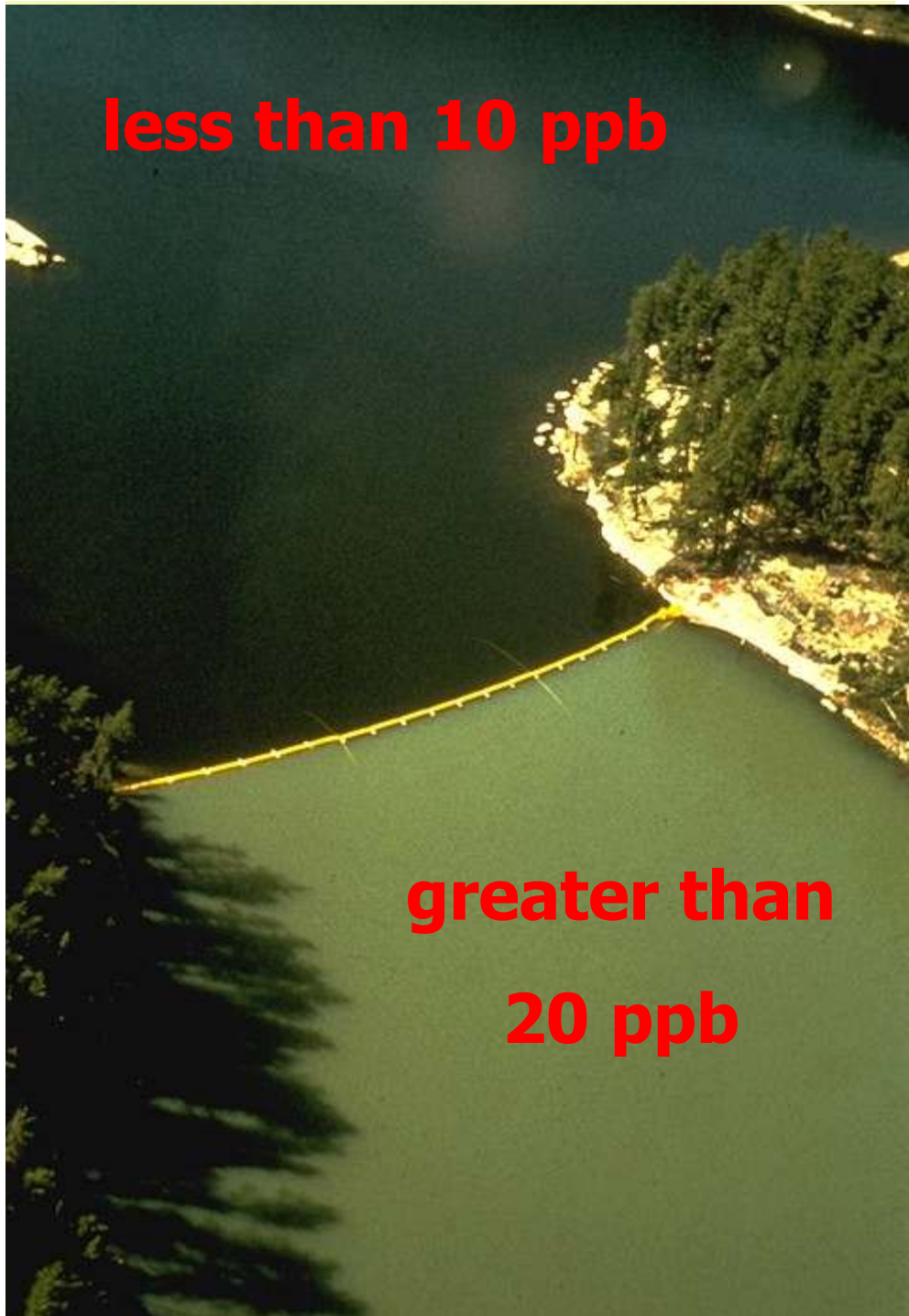


Phosphorus attached to small
particles carried in *stormwater* from
anywhere in the watershed



PHOSPHORUS FROM SEDIMENTS





Canadian Experimental Lakes Area (#226)

- Pristine lake divided in two
- P added to only one side

Source: ELA, Fisheries and Oceans Canada



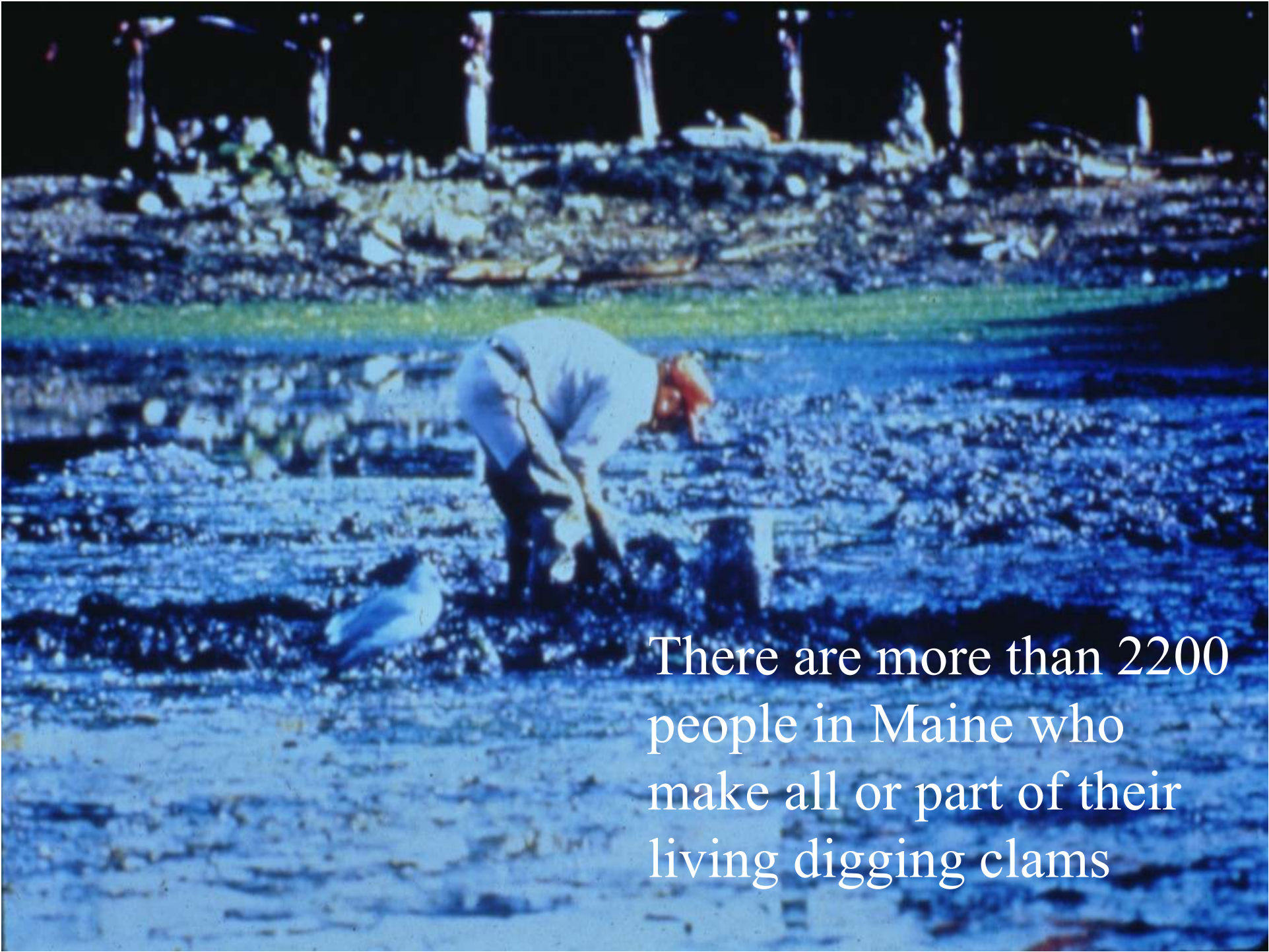




Toxics

Nutrients = Algae = Oxygen Loss

Bacteria = Shellfish Closures

A photograph of a person in a light-colored shirt and dark pants, bent over and digging in the sand on a beach. A white seagull is standing near the person. In the background, there is a rocky shoreline and a wooden pier structure. The text "There are more than 2200 people in Maine who make all or part of their living digging clams" is overlaid on the bottom right of the image.

There are more than 2200
people in Maine who
make all or part of their
living digging clams

Impacts of Stormwater Pollutants

Toxicity

- stormwater kills test organisms 8-10 days

Sediment

- smothering habitats
- adsorbed pollutants
- lake/reservoir storage

Oil and Grease


- toxic substrates
- hydrocarbons

Algal Blooms

- fish kills
- odor and taste problems
- human health

Bacteria

- pathogens
- fishable/swimable
- Shellfish closures



To Minimize Impacts From Polluted
Stormwater on Habitat and Water
Quality, Municipalities can Adopt Low
Impact Development Standards

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

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Low-Impact Development (LID)—





- Retain the natural landscape
- Reduce impervious surfaces
- Emphasize on-site drainage of stormwater
- Encourage riparian buffers
- Require proper septic system placement, design, and maintenance
- Require stormwater management plans



York Ordinance Language 2007

Low Impact Design. Each applicant is *required to submit a statement* to the Planning Board *documenting proposed Low Impact Design (LID) for the site*, which will help to reduce stormwater volumes and help to enhance stormwater quality. LID includes, but *is not* limited to green roofs, rain gardens, tree wells, infiltration basins, and permeable pavement. The applicant shall submit technical documentation about the suitability of such designs with the request for LID features.

South Portland

Promoting Small-Lot Stormwater Treatment Practices at the Municipal Level



HOME	<h3>Small Site Stormwater Solutions</h3>	<div>Stormwater Manual What is Stormwater? Permit Requirements Stormwater Solutions Stormwater Links Overview of Systems</div>
Online City Services	Stormwater Manual > Stormwater Solutions	
About Us	South Portland is providing information on effective stormwater solutions for small sites (less than one acre). This information is intended to help those are facing permit requirements under South Portland ordinance, as well as those who simply want to protect and improve the environment.	
Agendas-City Council	View a quick overview of all the stormater systems .	
Agendas-Planning Board		
Boards & Committees		
Budget & Financial Reports		

Low Impact Development

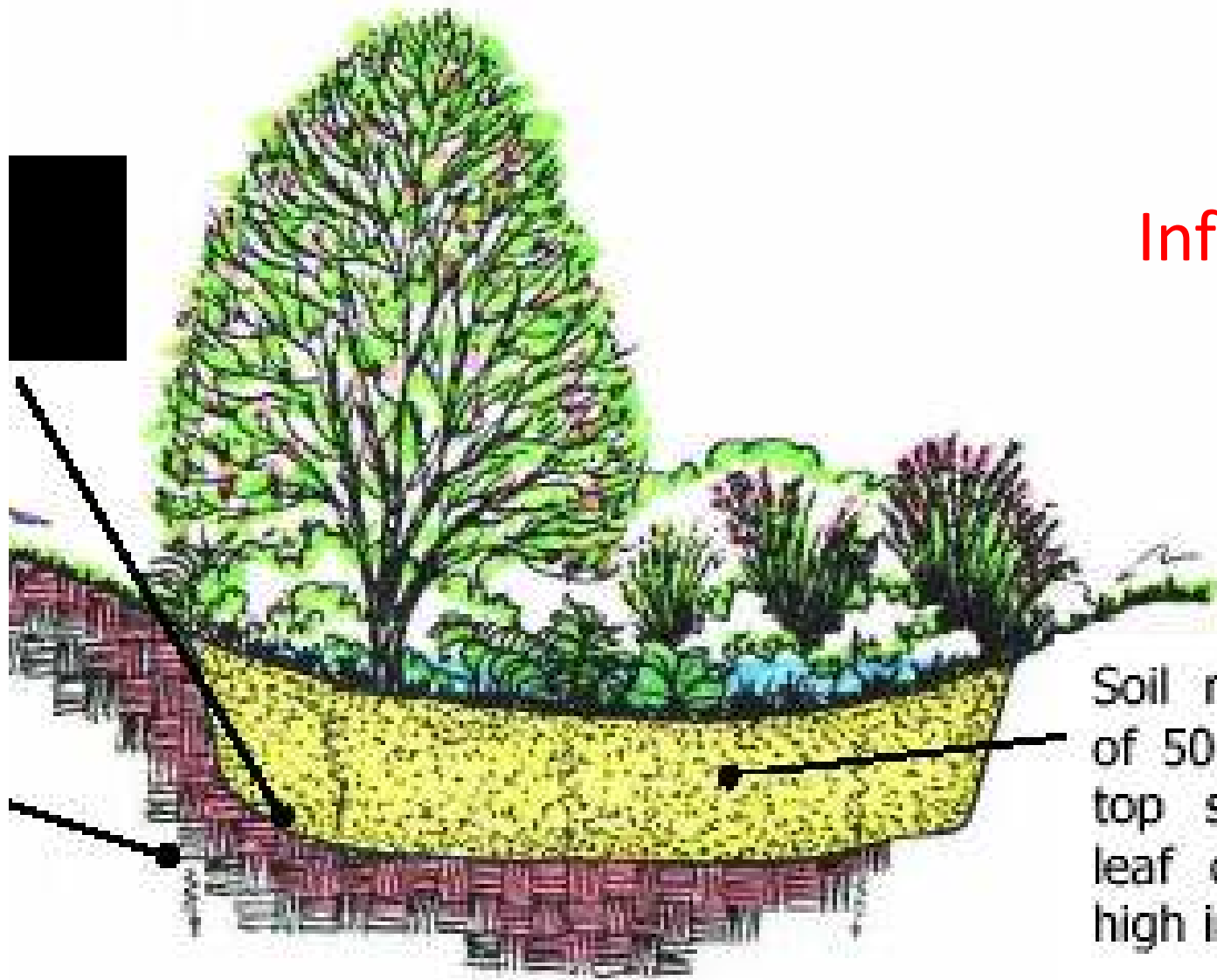


Treat rainfall close to where it falls

Roof Runoff is
very clean-
soak it back
into the
ground!



Infiltration areas



Soil medium consisting of 50-60% sand, 20-30 top soil, and 20-30% leaf compost allows a high infiltration capacity

Infiltration/Recharge Facility (enhanced infiltration)

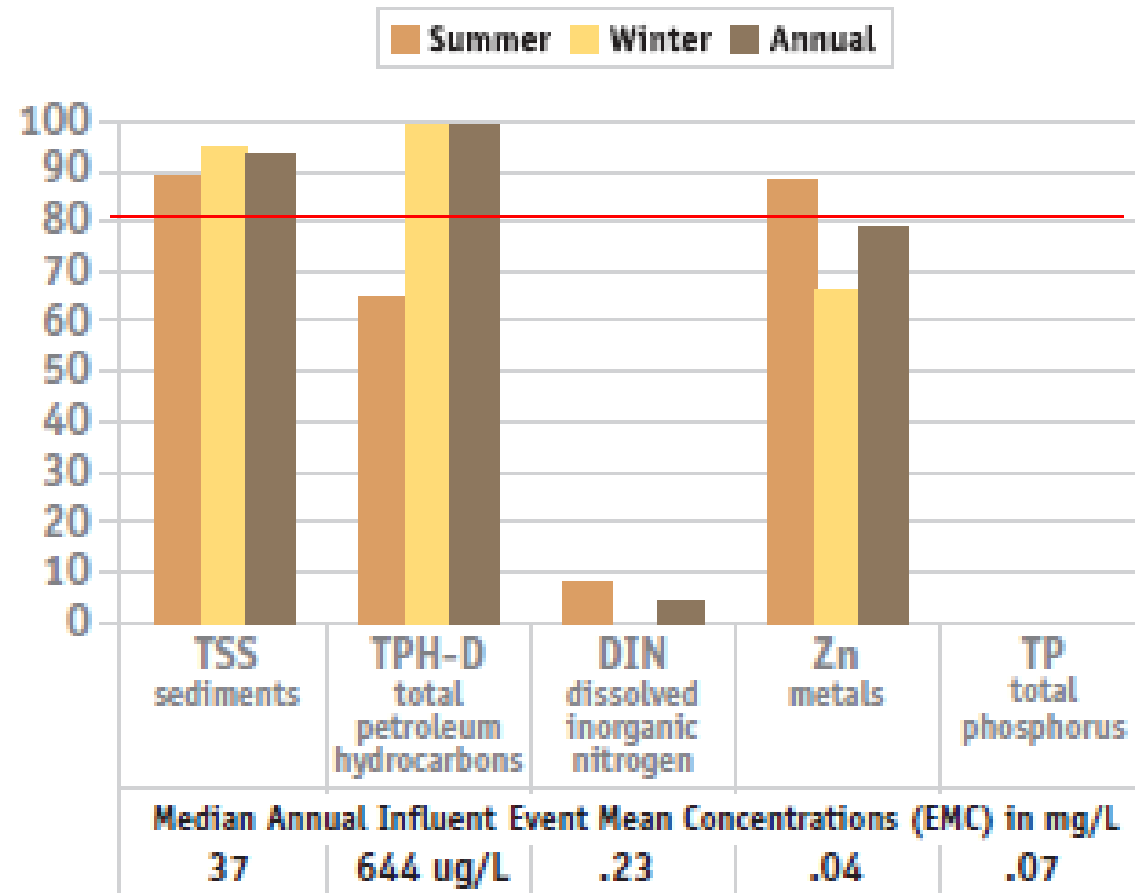




Tree Box Filter



POLLUTANT REMOVAL: 2004–2008



Subsurface Gravel Wetland





Rain Gardens



Back Cove Rain Garden



Orono Rain garden



Infiltration Steps soak in the water



Porous concrete York Hospital



Green Roofs



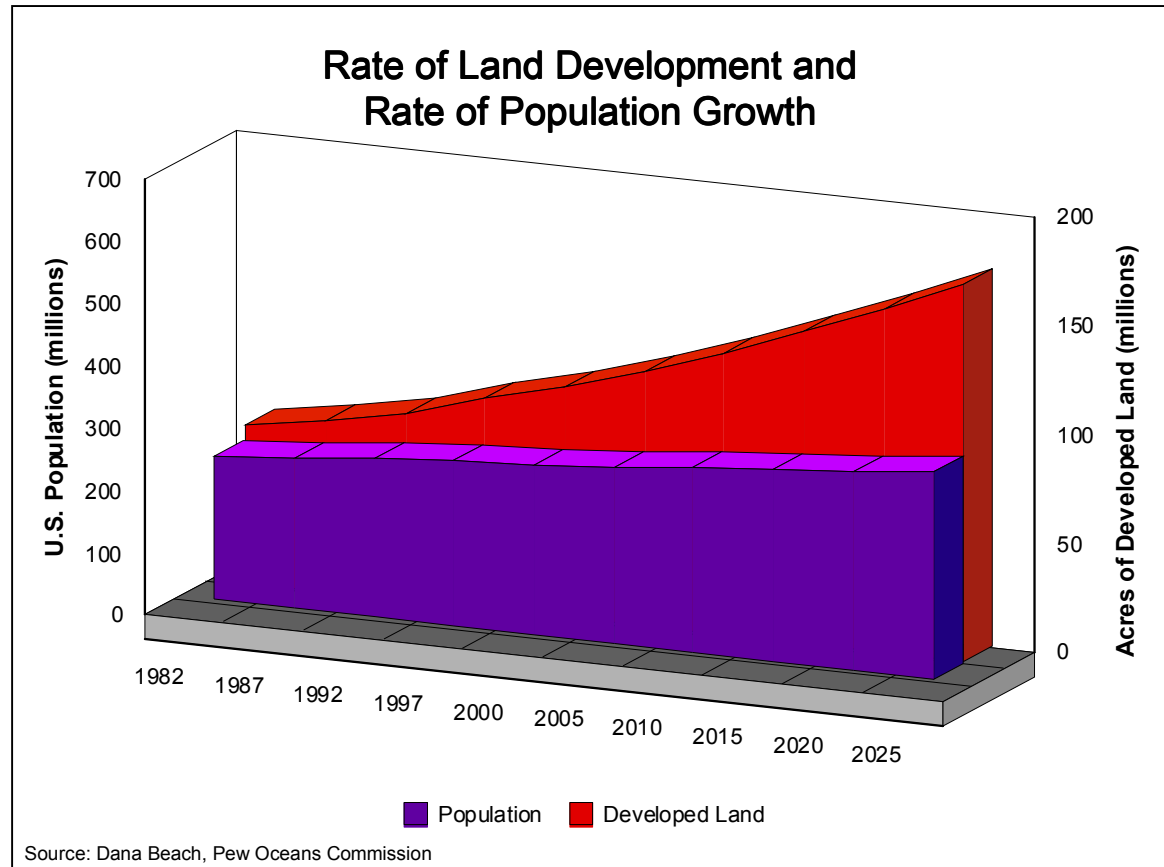
Rockland Green roof



More land is used per person with new development

•more than 1/4th of all the land converted from rural to urban and suburban uses since European settlement occurred in only 15 years.

1982-1997



What does growth look like?

2 Acre Residential

0.21 acres impervious area per house

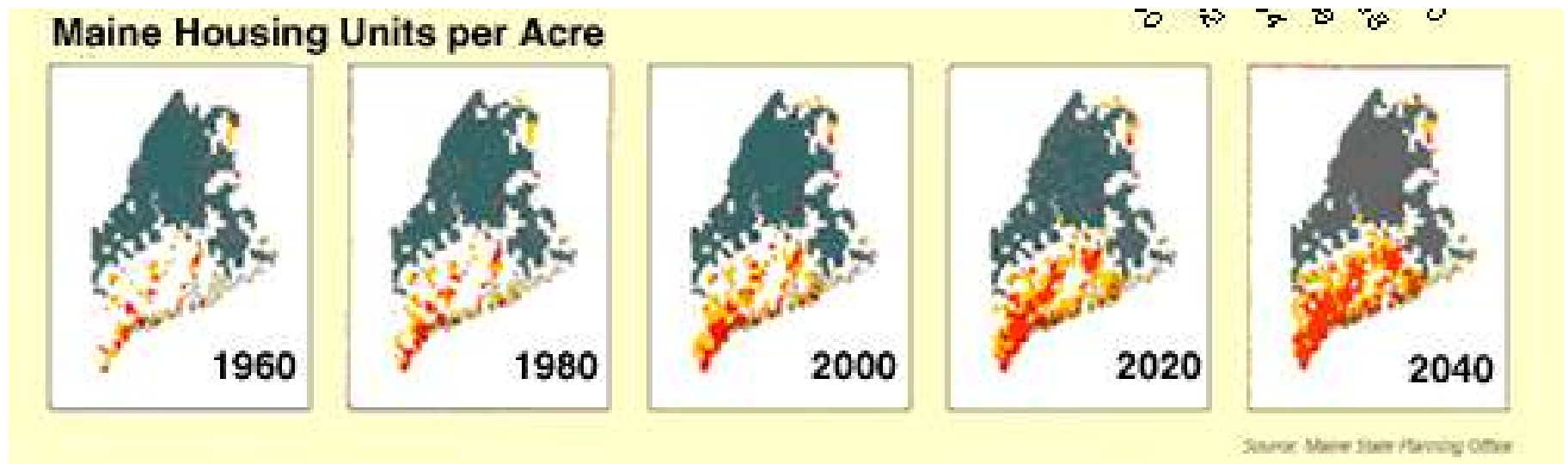


Carving Up the Landscape



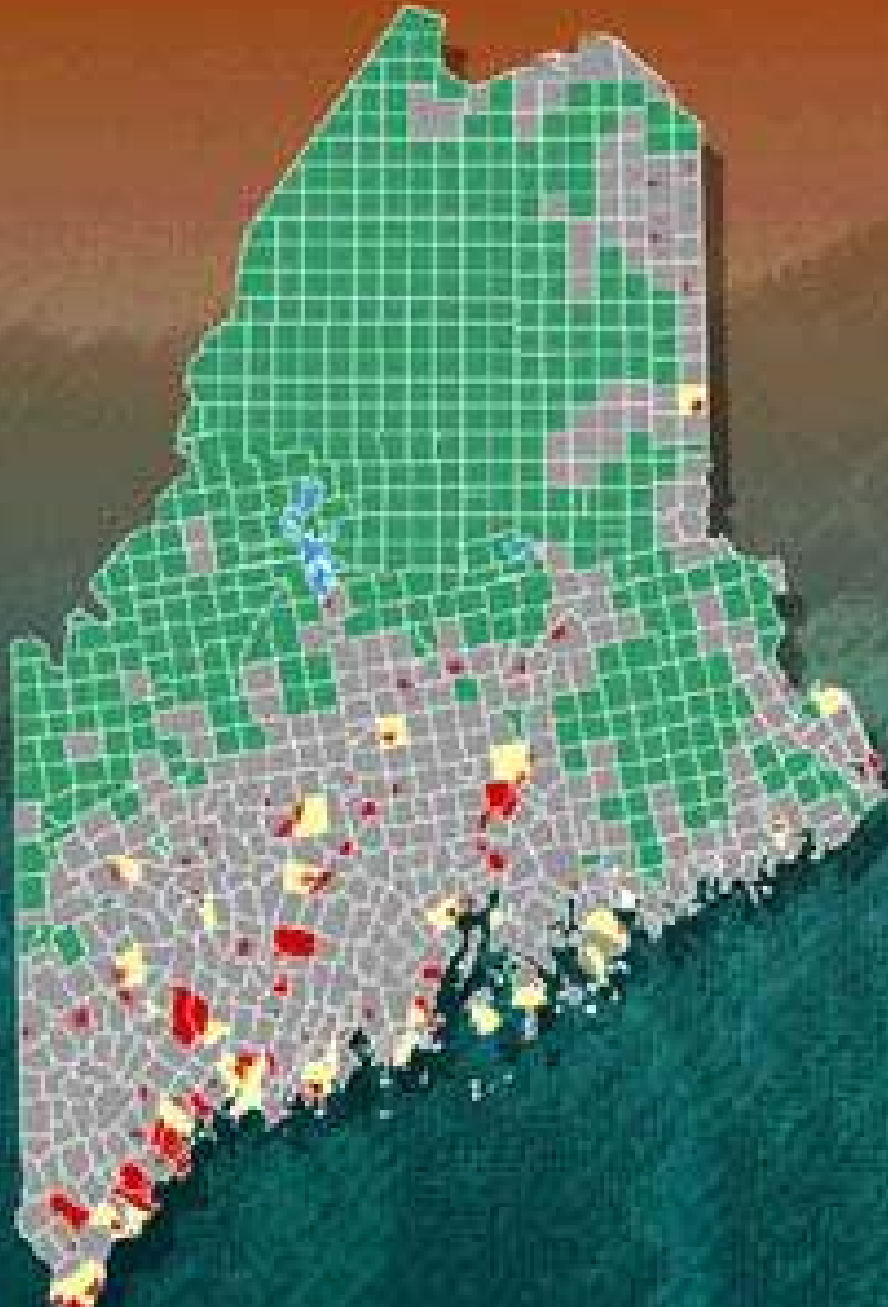


Growth in Maine



Expansion of Development

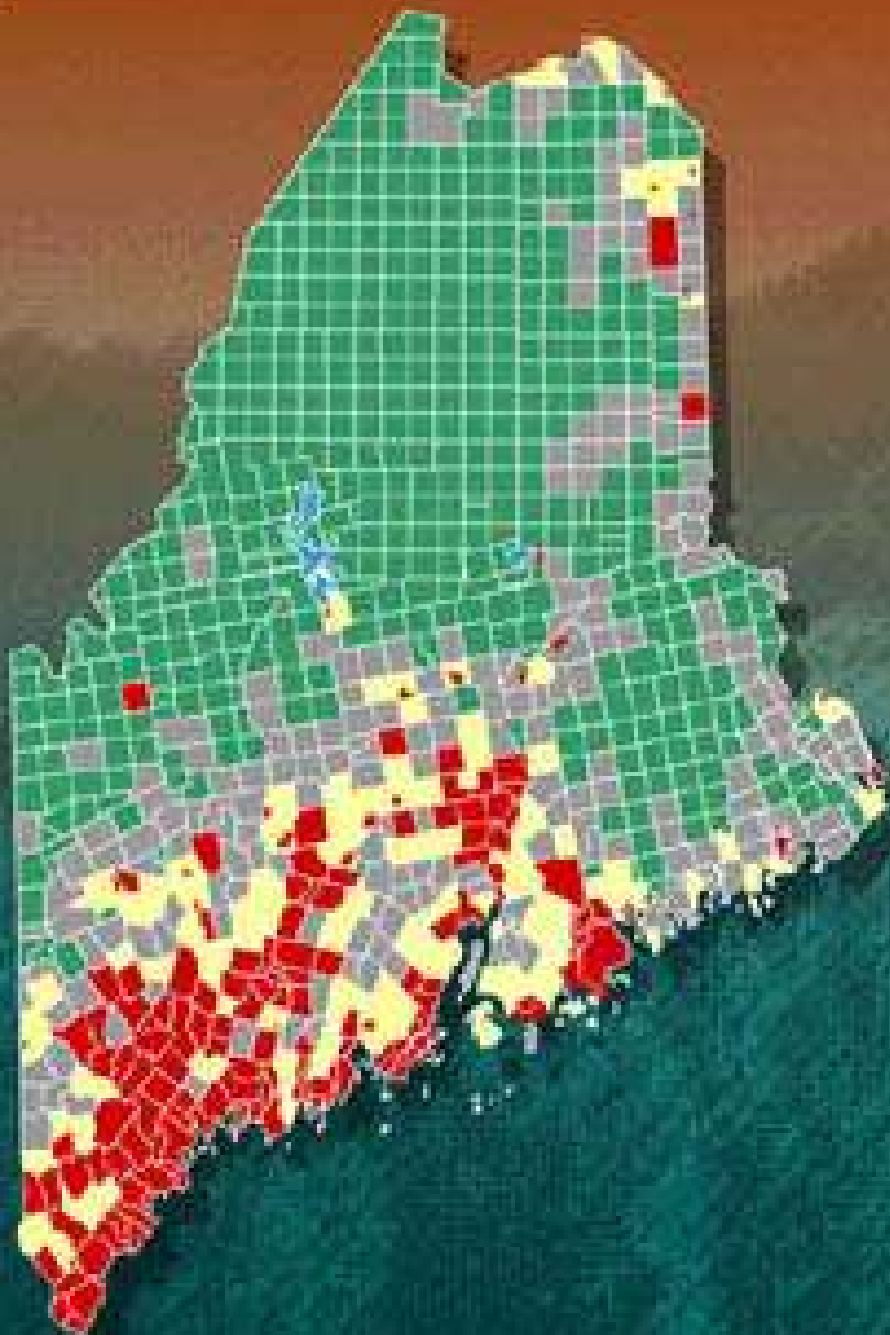
1940

- 
- A map of a coastal region, likely Long Island, showing land use in 1940. The map is divided into four categories: suburban/urban (red), emerging suburb (yellow), rural (grey), and unorganized (green). The unorganized area covers the northern and western parts of the land, while the suburban/urban and emerging suburb areas are concentrated along the southern and eastern coasts. The map is overlaid with a green grid.
- suburban/urban
 - emerging suburb
 - rural
 - unorganized



Expansion of Development (projected)

2030



- suburban/urban
- emerging suburb
- rural
- unorganized



How do towns deal with growth?

Good Planning:

Using Density to protect natural resources

Action:

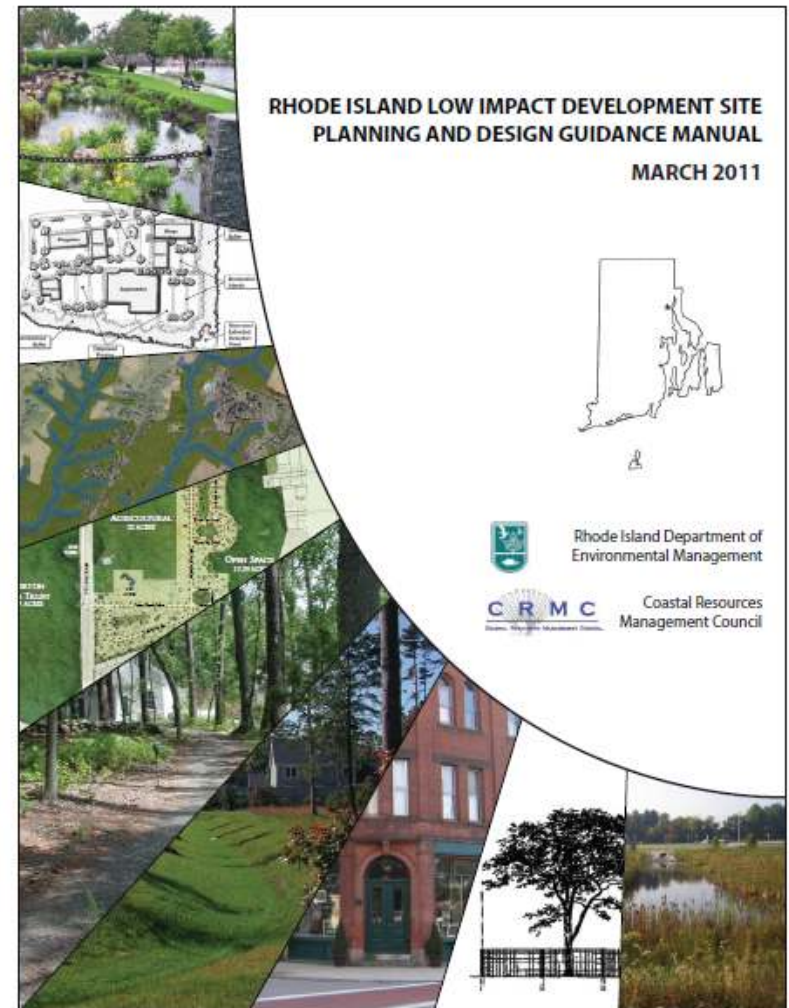
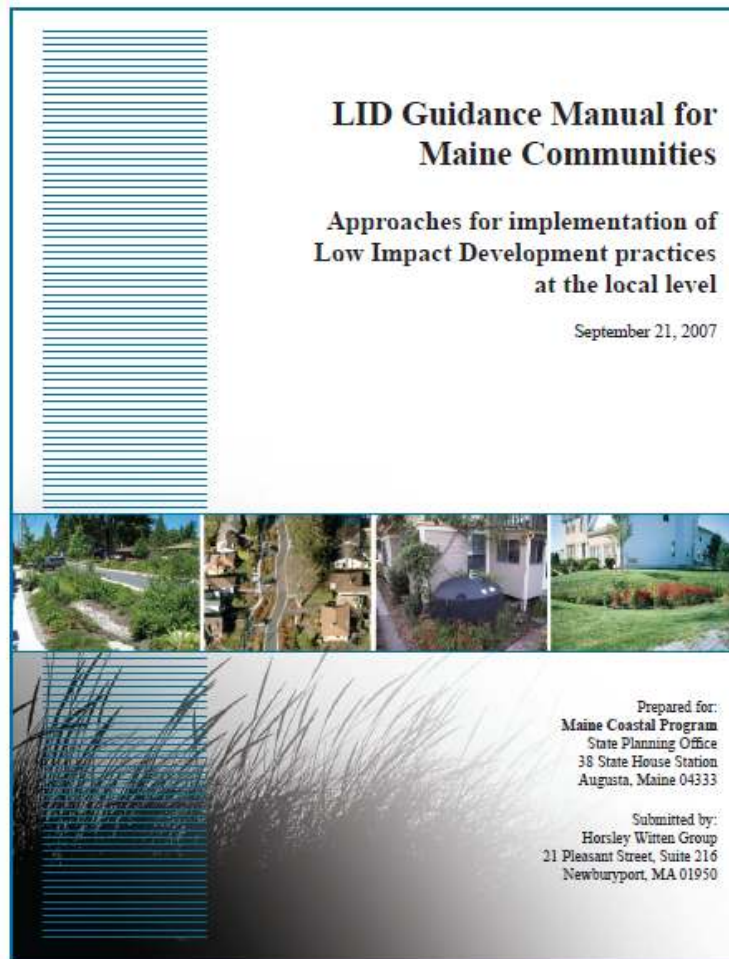
- Zoning
- Site Design
- BMP's and Remediation



Density is a
BMP



SPO Model Ordinance 2007

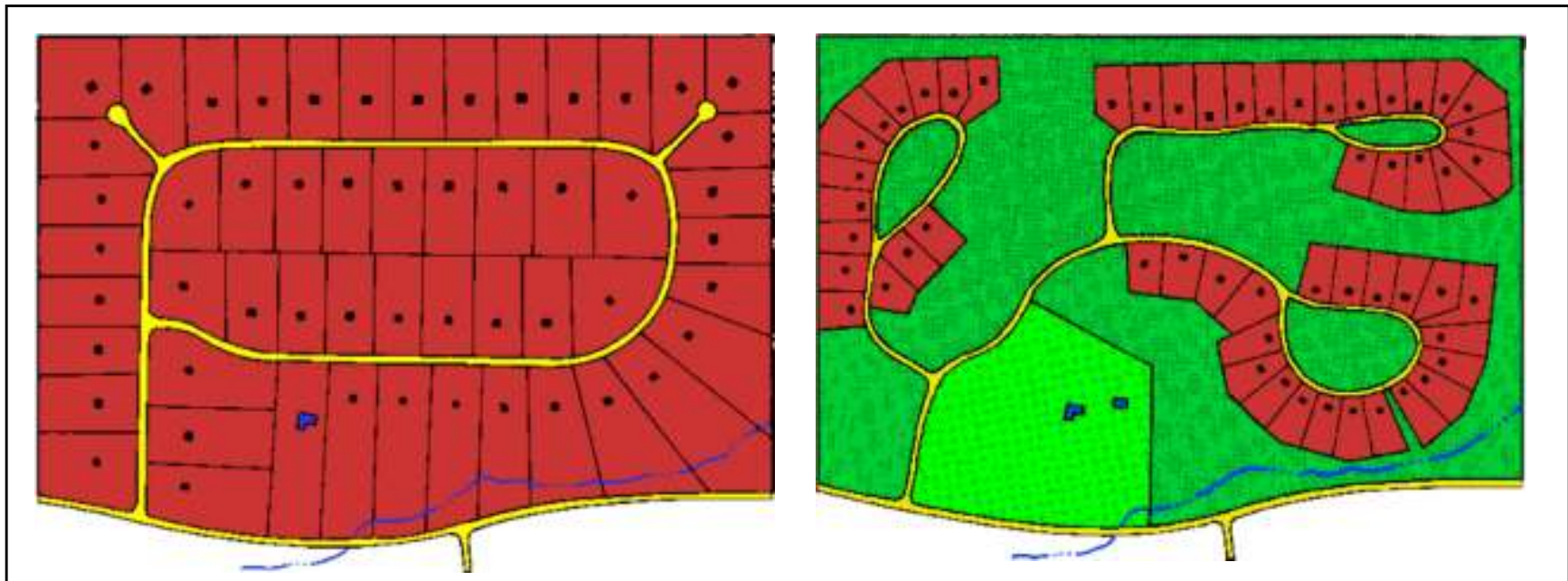


Town of York Zoning Ordinance

Concerning Cluster Subdivisions

As an alternative to conventional residential subdivision design, the purpose of cluster subdivision design is to protect important components of the natural and cultural environment while encouraging quality residential neighborhood design. The primary mechanism to accomplish this purpose is the reduction of individual lot sizes and dimensional standards, with the balance of land set aside into a common open space.

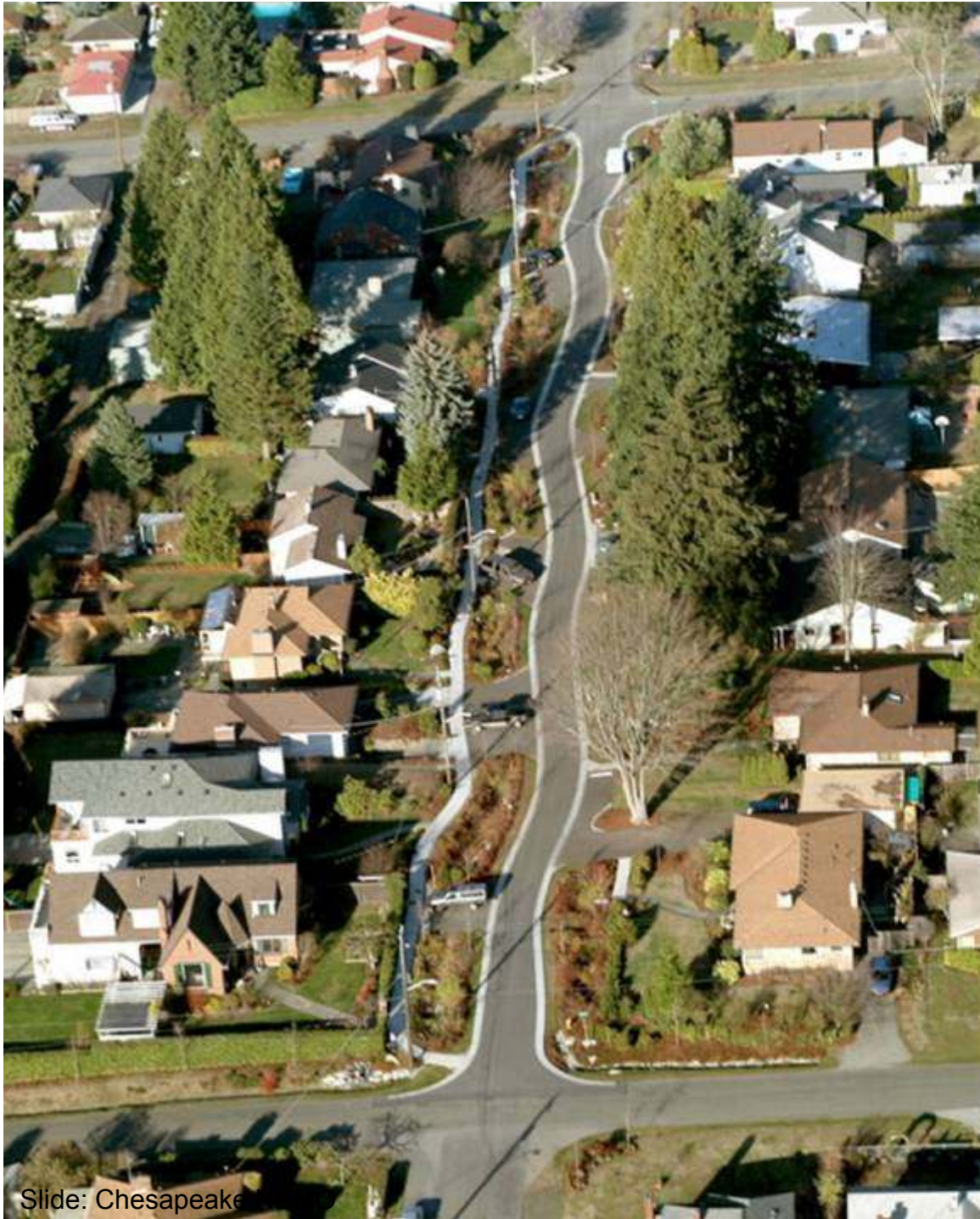
Open Space Developments



- same number of housing units
- 10-50% less impervious surface

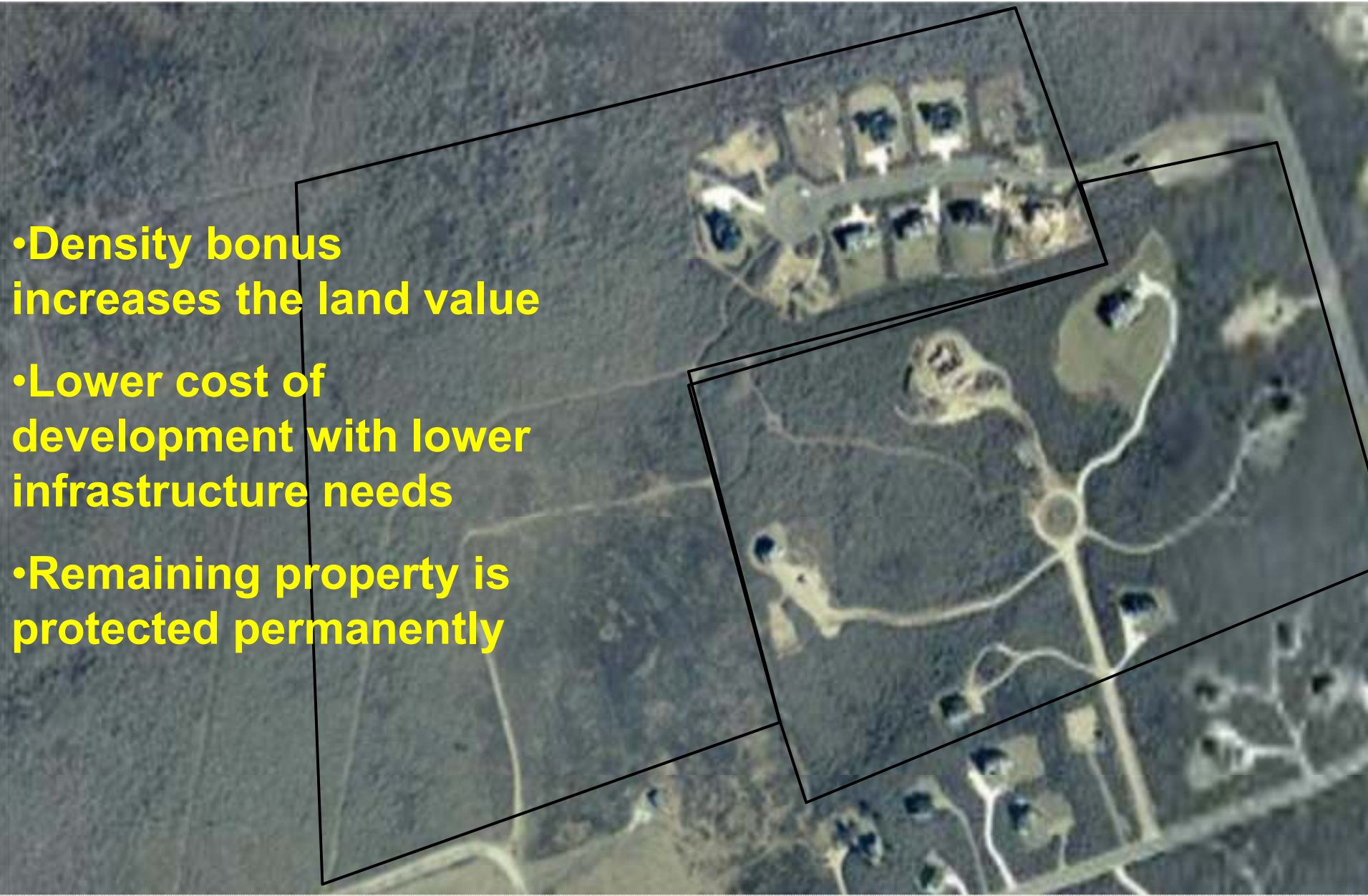
- up to 50% open space
- water resources protected

From Randall Arendt



25% Savings



- 
- **Density bonus increases the land value**
 - **Lower cost of development with lower infrastructure needs**
 - **Remaining property is protected permanently**

Why would a landowner want to do this?



**2 Acre
Residential**

**0.21 acres
per house**




**1 Acre
Residential**

**0.14 acres
per house**



**1/2 Acre
Residential**

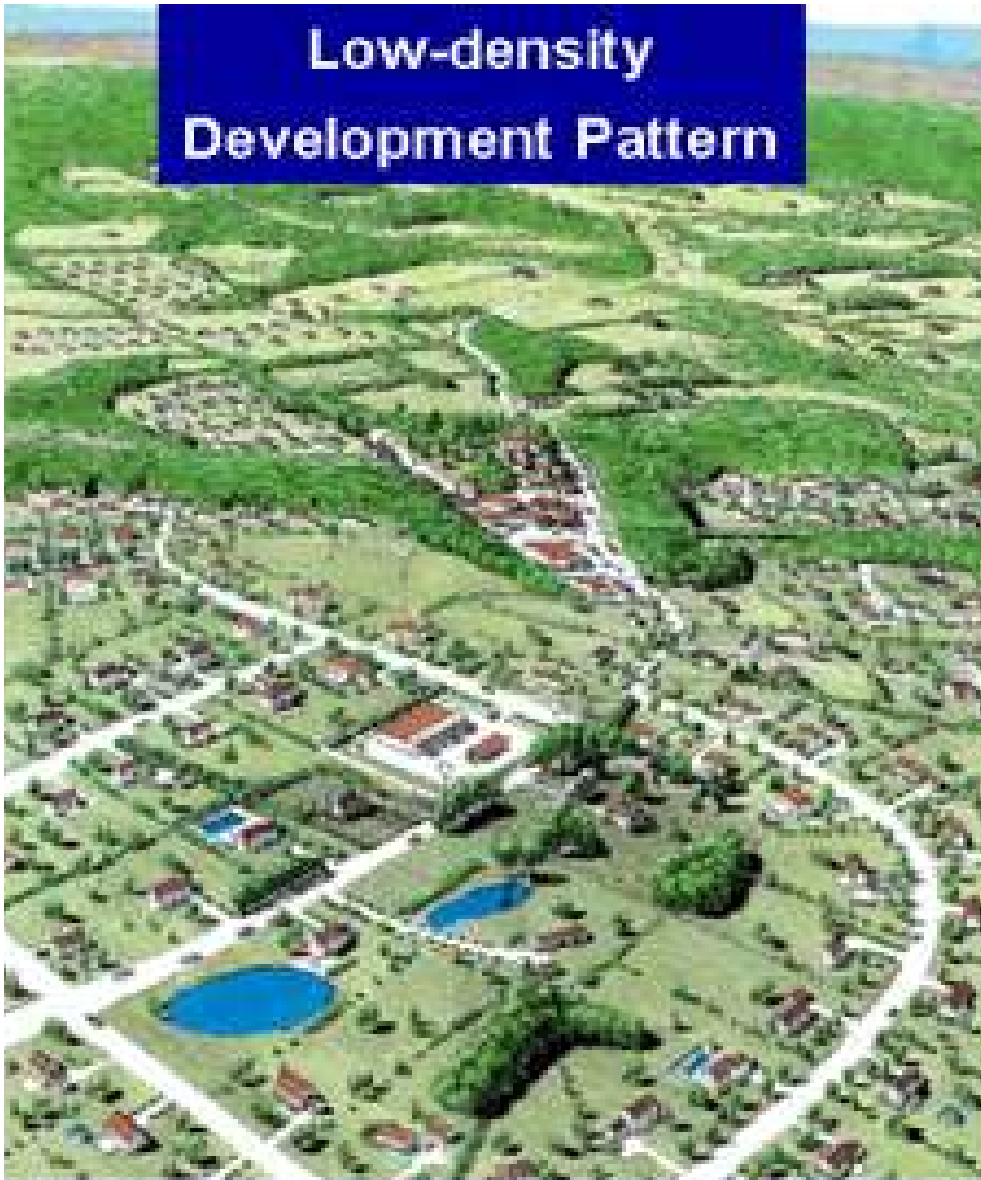
**0.11 acres
per house**

An aerial photograph showing a residential development. A road with a roundabout runs horizontally across the upper middle. Several houses are visible, some with swimming pools. A stream or creek flows from the bottom right towards the center, with a smaller tributary joining it. The surrounding area is mostly dark, suggesting dense vegetation or forest. The text is overlaid on the left side of the image.

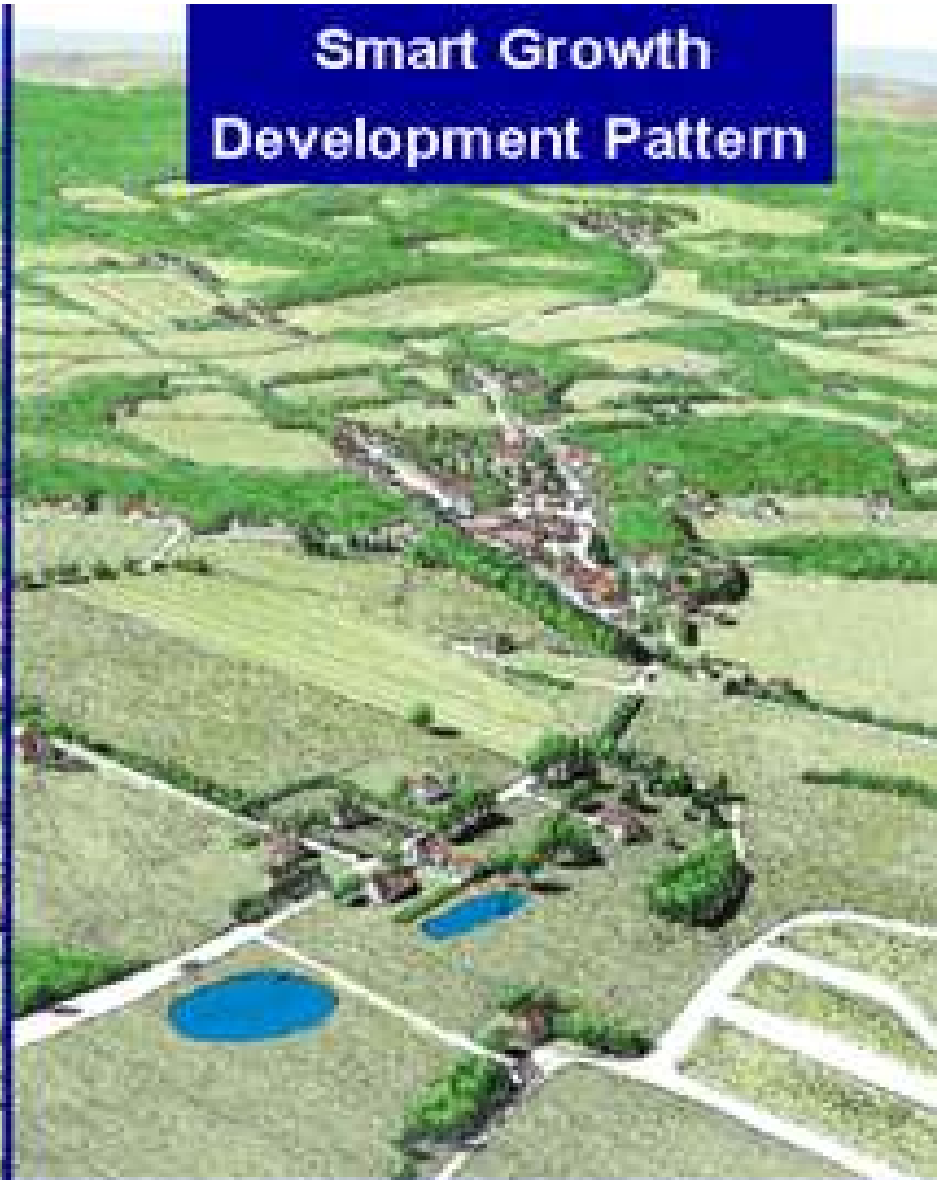
Connectivity to existing natural areas and trail systems means that lots are more attractive to buyers

Retaining buffers and protecting water quality means that everyone in town benefits

**Low-density
Development Pattern**

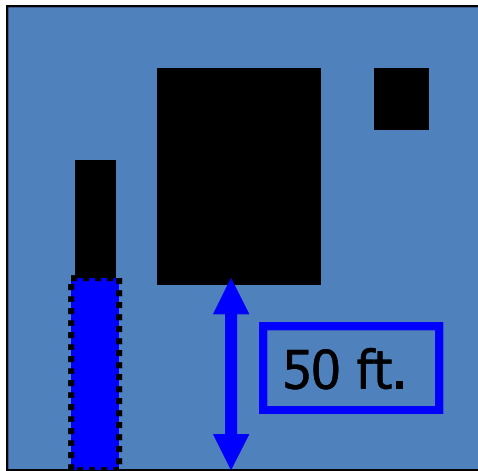


**Smart Growth
Development Pattern**

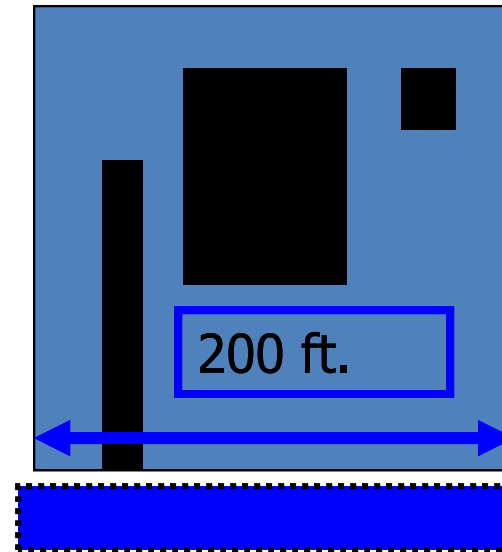


Two alternatives for future growth at a regional scale. The same number of people are accommodated in both scenarios.

Requirements for building placement



Setbacks



Frontage

Do Your Regulations Promote
Imperviousness?




In Summary

To minimize impacts from excessive runoff and polluted stormwater, municipal ordinances should be modified to:

- Retain the natural landscape as much as possible by incorporating the concept of cluster development**
- Reduce impervious surfaces to the maximum extent possible by incorporating requirements for more vegetated areas as well as pervious pavement or concrete**
- Emphasize on-site drainage of stormwater using rain gardens, infiltration areas and green roofs**
- Encourage riparian buffers**
- Require stormwater management plans for development projects**

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The Department can provide technical assistance to municipalities who would like to modify their ordinances to incorporate Low Impact Development standards. For more information Please contact Bill Laflamme at: 215-9237

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www.maine.gov/dep

